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Both lithologically and paleontologically the Pottsville formation constitutes a division of the Carboniferous coördinate with the Lower Coal-measures, Alleghany series, etc. As such it forms the lower member of what may in a broad sense, be termed the Mesocarboniferous in the Appalachian province.

The lowest beds in the thickest sections, which appear to be continuous by transition with the deposition of the Maunch Chunk red shales, are perhaps to be regarded as coarse, coast-detrital redepositions, contemporaneous with the uppermost beds of the red shale or marine Lower Carboniferous sediments of other regions.

The flora of the Pottsville formation is so far identical, in both its generic and its specific composition, with that from the supposed Middle Devonian beds at St. John, as to leave no room for a great difference in the age of the latter.

CHARLES R. KEYES.

Iowa Geological Survey; SAMUEL CALVIN, State Geologist; A. G. LEONARD, Assistant State Geologist; Annual Report for 1900 (Vol. XI, 519 pages, 12 plates, 43 figures, 9 maps. Des Moines, 1901).

In scope and style this report follows closely the previous volumes of the series. It includes the usual administrative reports, the statistical reports of the mineral production, and detailed reports on Louisa, Marion, Pottawattamie, Cedar, Page, and Clay and O'Brien counties, the last two being treated together. These reports are written by J. A. Udden, B. L. Miller, J. A. Udden, W. H. Norton, Samuel Calvin, and T. H. Macbride respectively. They contain a careful review in each case of the local geology and serve to put on record facts and observations which may be used in later discussion of the theoretical problems involved. Following the usage of the survey, these discussions are taken up as fast as the development of the general survey allows them to be intelligently discussed. In the case of Louisa county, for example, the problems of the drift of that region have already been discussed in their theoretical phases in Mr. Udden's report on Muscatine county, Mr. Norton's report on Scott county, and Mr. Leverett's well-known monograph.¹ In the Louisa report Mr. Udden gives many interesting and valuable details confirmatory of the

¹ U. S. Geol. Surv., Mon. XXXVIII. The Illinois Glacial Lobe.

general conclusions already reached. In the Cedar county report, on the other hand, Mr. Norton places clearly before the reader the facts as to the structure and situation of the beautiful land forms to which McGee has given the name *paha*, and also states the various hypotheses which have been suggested for their origin. He makes no attempt, however, to balance the probabilities and reach a decision in the matter. The same method is observed in the discussion of the high dips observed in the Gower limestone of the Niagara. This is confessedly a difficult problem, and its solution is wisely left until the whole area shall have been studied.

In the reports on Page and Pottawattamie counties the survey takes up the southwestern portion of the state. Apparently most interesting results are likely to follow this survey. Mr. Calvin's suggestion that the drift of Page county may be the pre-Kansan instead of the Kansan fits in with many of the known facts of the field in Iowa and neighboring states. It is a far-reaching suggestion, and the development of the hypothesis will be watched with interest. In Pottawattamie county the facts are possibly susceptible of either interpretation. Mr. Udden does not, however, discuss the probabilities. His report is particularly interesting to the general student in the large use which he makes of mechanical analyses in the study of the drift. This is a method which seems likely to become more and more useful in the study of unconsolidated materials. The important results already reached by Whitney in the study of soils seem merely the forerunners of what is possible on a wider application of the method to the study of geological problems in general. Mr. Udden's hypothesis of the origin of the rivers of the county is ingenious, but the argument is not altogether convincing. The suggestion that the surface of a great ice sheet would afford a better opportunity for the development of such a regular system of rivers than the drift surface left by the melting away of the ice seems open to question. The surface of the Kansan drift, it is true, is everywhere notably even. It is impossible, however, to suppose that so thick and widespread a drift sheet as this would be laid down without the development of moraines and other surface irregularities. Yet such irregularities, where they now occur, are very faint, and are apparently the marks of much greater original irregularities. The present plane surface seems likely to be a result of erosion itself. Remembering the long period since these older drifts were deposited and the manifestly great erosion to which they have been subjected, it

seems a bit fanciful to believe that the streams now have a general course originally developed on the top of the ice. It is also difficult to imagine how streams, granting that they were developed on the ice in a symmetrical fashion, could be transferred to the drift surface during the melting of the ice without disturbance of their arrangement. If the disappearance be supposed to be accomplished by frontal retreat, the edge of the ice itself will give a sufficiently marked line for the development of the cross streams, and the major streams would in all probability be developed normal to the ice front. This apparently accords with the facts of the field and does not involve the difficulty of accounting for the development of a vigorous surface drainage on the ice and its transfer to the drift surface without notable destruction of its arrangement. The whole problem is an interesting one, and certainly Mr. Udden's hypothesis, if valid, is widely applicable. If we are to be able from the present stream arrangement to infer so much regarding the condition during glacial times a considerable step in advance is made. This fact warrants the closest skepticism in examining the hypothesis.

The volume as a whole is one which geologists will welcome. While the long series of annual reports made up of separate county reports is confusing to one not familiar with the region, the survey is systematically building up a work which will prove valuable not only to students of the local geology but to geologists in general. The work will lend itself to final summary treatment, and in the meantime the county reports not only serve a useful purpose locally, but enable outsiders to keep in touch with the results. The progress map of the drift mapping (plate II) is particularly valuable in this regard.

H. F. B.

Beach Structures in the Medina Sandstone. By H. L. FAIRCHILD.
American Geologist, Vol. XXVIII, pp. 9-14, plates 2-6.

In the July number of the *American Geologist* Professor H. L. Fairchild discusses the "Beach Structures in the Medina Sandstone." The features considered are certain troughs and swells of a breadth ranging from thirty to eighty feet. These are assumed to be of the same nature (probably in some cases the same examples) as those which formed the basis of Dr. Gilbert's theory of "giant ripples." Gilbert had concluded (*Bulletin Geol. Soc. Amer.*, March 1899) that with